

Scanning the Past

Lee de Forest and the Amplifying Audion

Seventy-five years ago this month, the INSTITUTE OF RADIO ENGINEERS (IRE) awarded its Medal of Honor to Lee de Forest as recognition for his invention of the three-electrode amplifier and his other contributions to radio. In 1946 he received the Edison Medal of the American Institute of Electrical Engineers (AIEE) and the citation mentioned the profound technical and social consequences of the grid-controlled vacuum tube which he had introduced. Known for having a rather flamboyant personality, de Forest (shown in Fig. 1) was both an entrepreneur and a prolific inventor who received more than 300 patents.

De Forest was born in Council Bluffs, IA, in 1873, the son of a Congregational minister. In 1879, the family moved to Talladega, AL, where his father served as president of Talladega College. After attending a college preparatory school in Massachusetts for two years, de Forest enrolled at the Sheffield Scientific School at Yale University in 1893, where he graduated in 1896. He went on to earn a doctoral degree from Yale in 1899 with a dissertation on standing waves produced by Hertzian waves on an open-ended transmission line. His first employment after college was in the Dynamo Department of the Western Electric Company in Chicago. He experimented with wireless communication in his spare time and developed a device he called a responder as an alternative to the coherer as a detector of wireless waves. He left Western Electric in 1901 and worked as an editor for the *Western Electrician* and as a part-time teacher until early in 1902 when he organized the de Forest Wireless Telegraphy Company. His company gained publicity from public demonstrations of wireless communication and the award of a gold medal for the best wireless system at the 1904 World's Fair in St. Louis. The U.S. Navy also began to purchase some of the radio apparatus manufactured by the de Forest Company.

In 1906, de Forest filed a patent application on a wireless detector which he called an audion and which, in its initial form, was a two-electrode device. He presented a technical paper at an October 1906 AIEE meeting, "The Audion: A New Receiver for Wireless Telegraphy," and commented that in all this work, a bewildering host of new and puzzling phenomena is continually encountered. He anticipated that the audion would provide "... rich fields for study to the physicist and delight to the practical man."

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Fig. 1. This classic photo shows Lee de Forest with a radio receiver in 1921. (Photo courtesy of the Clark Collection, the Smithsonian Institution.)

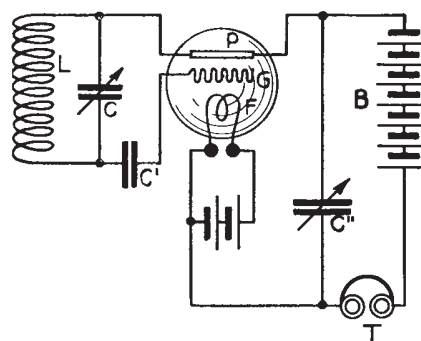


Fig. 2. The de Forest ultra-audion circuit [1].

In January 1907 he applied for a patent on a three-electrode audion in which one electrode consisted of a control grid inside the tube. The following month he organized a new company, the De Forest Radio Telephone Company. During 1908 he staged a radio broadcast from the Eiffel Tower in Paris, France, which was received as far as 500 miles from the transmitter.

De Forest served as president of the Society of Wireless Telegraph Engineers and became a charter member of the